

**What Is Claimed Is:**

1           1.       A method for resolving conflicts between network service rules for  
2 network data traffic in a system where rule patterns with longer prefixes match  
3 before rule patterns with shorter prefixes, comprising:  
4           receiving a set of network service rules for network data traffic from  
5 multiple network services, wherein network service rules from different network  
6 services can possibly conflict;  
7           wherein each of the network service rules specifies, a filter that defines a  
8 prefix for a set of packets in the packet flow, and an action list that specifies one  
9 or more actions to be applied to the set of packets;  
10          identifying a conflict between a higher priority rule and a lower priority  
11 rule in the set of network service rules; and  
12          resolving the conflict by prepending an action list of the higher priority  
13 rule to an action list of a rule with a filter that defines a longer prefix.

1           2.       The method of claim 1, wherein if the set of packets associated  
2 with the higher priority rule is equal to the set of packets associated with the lower  
3 priority rule, resolving the conflict involves creating a new action list for the  
4 higher priority rule by prepending the action list of the higher priority rule to the  
5 action list of the lower priority rule.

1           3.       The method of claim 1, wherein if the set of packets associated  
2 with the higher priority rule is a superset of the set of packets associated with the  
3 lower priority rule, resolving the conflict involves creating a new action list for  
4 the lower priority rule by prepending the action list of the higher priority rule to  
5 the action list of the lower priority rule.

1           4.       The method of claim 1, wherein if the set of packets associated  
2 with the lower priority rule is a superset of the set of packets associated with the  
3 higher priority rule, resolving the conflict involves creating a new action list for  
4 the higher priority rule by prepending the action list of the higher priority rule to  
5 the action list of the lower priority rule.

1           5.       The method of claim 1, wherein if the set of packets associated  
2 with the lower priority rule intersects the set of packets associated with the higher  
3 priority rule, resolving the conflict involves:  
4           creating a new rule with a filter that defines the intersection of the set of  
5 packets associated with lower priority rule and the set of packets associated with  
6 the higher priority rule; and  
7           creating an action list for the new rule by prepending the action list of the  
8 higher priority rule to the action list of the lower priority rule.

1           6.       The method of claim 1, wherein prior to modifying a rule in the set  
2 of network service rules, the method further comprises cloning the rule to ensure  
3 that potential conflicts with rules that appear later in the set of network service  
4 rules are not overlooked.

1           7.       The method of claim 1, wherein the priority of a given rule is based  
2 upon one or more of the following:  
3           a priority associated with a network service from which given rule  
4 originated;  
5           a count of the number of prefix bits specified by the filter for the given  
6 rule; and

7 a time stamp indicating when the given rule was incorporated into the set  
8 of network service rules.

1 8. The method of claim 1, wherein an action specified by a network  
2 service rule can include, but is not limited to:

3 dropping a packet;  
4 gathering statistical information about the packet;  
5 controlling timer functions associated with the packet;  
6 modifying the packet; and  
7 passing the packet on.

1 9. The method of claim 1, wherein the multiple network services can  
2 include, but is not limited to:

3 a firewall service;  
4 a service level agreement monitoring service;  
5 a load balancing service;  
6 a transport matching service;  
7 a failover service; and  
8 a high availability service.

1 10. A computer-readable storage medium storing instructions that  
2 when executed by a computer cause the computer to perform a method for  
3 resolving conflicts between network service rules for network data traffic in a  
4 system where rule patterns with longer prefixes match before rule patterns with  
5 shorter prefixes, the method comprising:

6 receiving a set of network service rules for network data traffic from  
7 multiple network services, wherein network service rules from different network  
8 services can possibly conflict;  
9 wherein each of the network service rules specifies, a filter that defines a  
10 prefix for a set of packets in the packet flow, and an action list that specifies one  
11 or more actions to be applied to the set of packets;  
12 identifying a conflict between a higher priority rule and a lower priority  
13 rule in the set of network service rules; and  
14 resolving the conflict by prepending an action list of the higher priority  
15 rule to an action list of a rule with a filter that defines a longer prefix.

1 11. The computer-readable storage medium of claim 10, wherein if the  
2 set of packets associated with the higher priority rule is equal to the set of packets  
3 associated with the lower priority rule, resolving the conflict involves creating a  
4 new action list for the higher priority rule by prepending the action list of the  
5 higher priority rule to the action list of the lower priority rule.

1 12. The computer-readable storage medium of claim 10, wherein if the  
2 set of packets associated with the higher priority rule is a superset of the set of  
3 packets associated with the lower priority rule, resolving the conflict involves  
4 creating a new action list for the lower priority rule by prepending the action list  
5 of the higher priority rule to the action list of the lower priority rule.

1 13. The computer-readable storage medium of claim 10, wherein if the  
2 set of packets associated with the lower priority rule is a superset of the set of  
3 packets associated with the higher priority rule, resolving the conflict involves

4 creating a new action list for the higher priority rule by prepending the action list  
5 of the higher priority rule to the action list of the lower priority rule.

1 14. The computer-readable storage medium of claim 10, wherein if the  
2 set of packets associated with the lower priority rule intersects the set of packets  
3 associated with the higher priority rule, resolving the conflict involves:

4 creating a new rule with a filter that defines the intersection of the set of  
5 packets associated with lower priority rule and the set of packets associated with  
6 the higher priority rule; and

7 creating an action list for the new rule by prepending the action list of the  
8 higher priority rule to the action list of the lower priority rule.

1 15. The computer-readable storage medium of claim 10, wherein prior  
2 to modifying a rule in the set of network service rules, the method further  
3 comprises cloning the rule to ensure that potential conflicts with rules that appear  
4 later in the set of network service rules are not overlooked.

1 16. The computer-readable storage medium of claim 10, wherein the  
2 priority of a given rule is based upon one or more of the following:

3 a priority associated with a network service from which given rule  
4 originated;

5 a count of the number of prefix bits specified by the filter for the given  
6 rule; and

7 a time stamp indicating when the given rule was incorporated into the set  
8 of network service rules.

1           17.     The computer-readable storage medium of claim 10, wherein an  
2     action specified by a network service rule can include, but is not limited to:  
3           dropping a packet;  
4           gathering statistical information about the packet;  
5           controlling timer functions associated with the packet;  
6           modifying the packet; and  
7           passing the packet on.

1           18.     The computer-readable storage medium of claim 10, wherein the  
2     multiple network services can include, but is not limited to:  
3           a firewall service;  
4           a service level agreement monitoring service;  
5           a load balancing service;  
6           a transport matching service;  
7           a failover service; and  
8           a high availability service.

1           19.     An apparatus that resolves conflicts between network service rules  
2     for network data traffic in a system where rule patterns with longer prefixes match  
3     before rule patterns with shorter prefixes, comprising:  
4           a receiving mechanism configured to receive a set of network service rules  
5     for network data traffic from multiple network services, wherein network service  
6     rules from different network services can possibly conflict;  
7           wherein each of the network service rules specifies, a filter that defines a  
8     prefix for a set of packets in the packet flow, and an action list that specifies one  
9     or more actions to be applied to the set of packets;

10           a conflict detection mechanism configured to identify a conflict between a  
11 higher priority rule and a lower priority rule in the set of network service rules;  
12 and  
13           a conflict resolution mechanism configured to resolve the conflict by  
14 prepending an action list of the higher priority rule to an action list of a rule with a  
15 filter that defines a longer prefix.

1           20.    The apparatus of claim 19, wherein if the set of packets associated  
2 with the higher priority rule is equal to the set of packets associated with the lower  
3 priority rule, the conflict resolution mechanism is configured to:  
4           create a new action list for the higher priority rule by prepending the action  
5 list of the higher priority rule to the action list of the lower priority rule; and to  
6           delete the lower priority rule.

1           21.    The apparatus of claim 19, wherein if the set of packets associated  
2 with the higher priority rule is a superset of the set of packets associated with the  
3 lower priority rule, the conflict resolution mechanism is configured to create a  
4 new action list for the lower priority rule by prepending the action list of the  
5 higher priority rule to the action list of the lower priority rule.

1           22.    The apparatus of claim 19, wherein if the set of packets associated  
2 with the lower priority rule is a superset of the set of packets associated with the  
3 higher priority rule, the conflict resolution mechanism is configured to create a  
4 new action list for the higher priority rule by prepending the action list of the  
5 higher priority rule to the action list of the lower priority rule.

1           23.     The apparatus of claim 19, wherein if the set of packets associated  
2 with the lower priority rule intersects the set of packets associated with the higher  
3 priority rule, the conflict resolution mechanism is configured to:

4           create a new rule with a filter that defines the intersection of the set of  
5 packets associated with lower priority rule and the set of packets associated with  
6 the higher priority rule; and to

7           create an action list for the new rule by prepending the action list of the  
8 higher priority rule to the action list of the lower priority rule.

1           24.     The apparatus of claim 19, wherein prior to modifying a rule in the  
2 set of network service rules, the conflict resolution mechanism is configured to  
3 clone the rule to ensure that potential conflicts with rules that appear later in the  
4 set of network service rules are not overlooked.

1           25.     The apparatus of claim 19, wherein the priority of a given rule is  
2 based upon one or more of the following:

3           a priority associated with a network service from which given rule  
4 originated;

5           a count of the number of prefix bits specified by the filter for the given  
6 rule; and

7           a time stamp indicating when the given rule was incorporated into the set  
8 of network service rules.

1           26.     The apparatus of claim 19, wherein an action specified by a  
2 network service rule can include, but is not limited to:

3           dropping a packet;

4           gathering statistical information about the packet;



5           controlling timer functions associated with the packet;  
6           modifying the packet; and  
7           passing the packet on.

1           27.    The apparatus of claim 19, wherein the multiple network services  
2    can include, but is not limited to:  
3           a firewall service;  
4           a service level agreement monitoring service;  
5           a load balancing service;  
6           a transport matching service;  
7           a failover service; and  
8           a high availability service.